Iron Deposits after Orthokeratology

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Purpose

- To study the frequency of iron deposits after OK.
- To study the impact of iron deposits on vision.

Patients

- 32 patients, 64 eyes
- Age 29.2 ± 5.7 years
- Mean pre-OK myopia: 3.25 ± 1.25 D
- Orthokeratology for 14 ± 5 months
- OK lenses: Technolens (Switzerland), ProCornea/MPGE (Netherlands, Germany)

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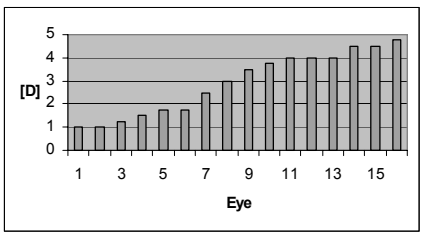
Methods

- Slit lamp examination (Zeiss SL 160)
- Visual acuity (Standard tests)
- Contrast sensitivity (Freiburger Visus Test)

Results

- 16 of 64 eyes (25 %) with arcuate iron deposits in the lower cornea (reverse zone of OK lens).
- First appearence 2 months after start of OK
- Mean: 5 ± 2 months
- No progression after first appearence

Spherical Equivalents before OK



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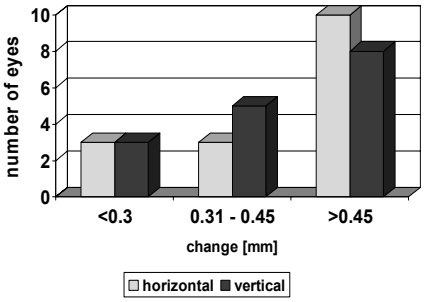
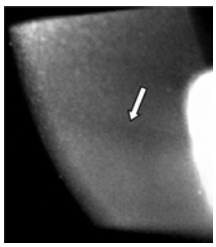
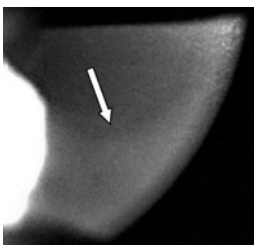
Changes of Corneal Radius



Ferritin Line after OK



Ferritin Line after OK



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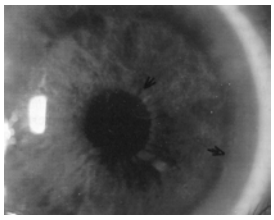
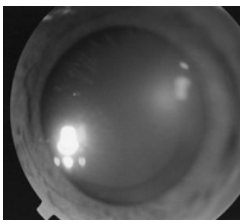
Iron Deposits or Ferritin Lines

- Ferritin lines occur seldom in isolation. They are associated with an underlying corneal problem.
  - ***Hudson-Stähli´s line (physiological in elderly)***
  - ***Ferry´s line (anterior to a filtering bleb)***
  - ***Stocker´s line (anterior to a pterygium)***
  - ***Fleischer´s ring: Keratoconus***
  - ***Foreign body***
  - ***Other (Diseases that distort the surface of the cornea, Keratoplasty, Intrastromal Corneal Ring, LASIK)***

Ferritin Line



LASIK



Keratoconus

Ferritin line after OK

- Iron deposits are related to poor tear film exchange
  - ***Ferritin line appears within the reverse zone of OK lenses.***
  - ***Stagnant tear film in the reverse zone***
- OK results in distortion of corneal surface
  - ***Iron uptake may be facilitated***
- No progression after a few months because of stabilization of the corneal epithelium.

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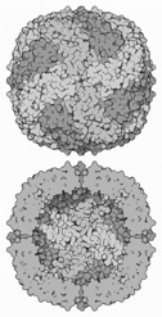
Iron Storage: Ferritin



- Iron storage within ferritin
  - ***Ferritin is composed of 24 identical protein subunits that form a hollow shell.***
  - ***4500 iron ions inside where they form small crystallites along with phosphate and hydroxide ions***

Ferritin

- Suppression of Fenton reaction:

$$Fe^{2+} + H_2O_2 \rightarrow Fe^{3+} + OH^* + OH^-$$

- Storage of ferric form: Fe_2O_3, $FePO_4$ and $Fe(OH)_3$
- Protects nucleus of epithelial cells from UV damage.

Visual functions after one year

- Iron deposits do not interfere with vision.
  - ***Visual acuity: 20/20 and better***
  - ***Contrast sensitivity: 45***
- No loss of visual acuity and contrast sensitivity compared to pre-OK values

Conclusions

- Iron deposits occur frequently after a few months of OK.
- There is no progression.
- The degree of corneal reshaping seems to influence iron deposits.
- Iron deposits do not interfere with vision.
- They seem to be harmless.

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